

PROCEEDINGS OF SPIE

International Conference on Automation and Intelligent Technology (ICAIT 2025)

Jiehan Zhou
Michael Khoo Boon Chong
Editors

8–10 August 2025
Wuhan, China

Organized by
Wuhan Textile University (China)

Sponsored by
Guangzhou Great Bay Area Artificial Intelligence Talent Federation (China)
Wuhan Qidesheng Conference Service Co., Ltd. (China)

Published by
SPIE

Volume 13812

Proceedings of SPIE 0277-786X, V. 13812

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *International Conference on Automation and Intelligent Technology (ICAIT 2025)*, edited by Jiehan Zhou, Michael Khoo Boon Chong, Proc. of SPIE 13812, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510695177

ISBN: 9781510695184 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2025 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL
LIBRARY**

SPIEDigitalLibrary.org

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

v *Conference Committee*

ROBOTICS, AUTOMATION, AND INTELLIGENT EQUIPMENT

- 13812 02 **Research on key technologies of low-cost drilling robot end-effector** [13812-2]
- 13812 03 **Research on the motion characteristics of underwater cleaning robot in cooling pool of substation under typical working conditions** [13812-9]
- 13812 04 **Kinematic control of robotic manipulator by an enhanced explicit zeroing neural network** [13812-10]
- 13812 05 **Analysis of large tooling rigidity for SimSolid under binding constraints** [13812-16]
- 13812 06 **Augmented reality empowered precision aircraft assembly: error suppression and process optimization of fuselage system component assembly using optical projection technology** [13812-21]
- 13812 07 **Research on vibration feature-driven prediction method of TBM cutter speed** [13812-28]
- 13812 08 **Research on key technologies and inspection methods of intelligent crane** [13812-32]

ARTIFICIAL INTELLIGENCE, MACHINE LEARNING, AND COMPUTER VISION

- 13812 09 **Low-light enhanced gradient transfer fusion: a collaborative optimization approach for infrared-visible image fusion** [13812-1]
- 13812 0A **Dual-activated channel-spatial attention with contrastive learning for ship SAR image classification** [13812-4]
- 13812 0B **Research on autonomous game for security of satellite Internet of Things based on embodied large models** [13812-18]
- 13812 0C **Optimizing ANN structures for nonlinear system modeling in control engineering** [13812-19]
- 13812 0D **Lightweight traffic object detection based on knowledge distillation** [13812-24]
- 13812 0E **Robust masked face recognition using CBAM and FFT for global and local feature enhancement** [13812-25]

- 13812 0F **Blind tone-mapped video quality assessment using spatiotemporal features** [13812-35]
- 13812 0G **CS-SegFormer: a dual-path attention enhanced segmentation network for metallographic grain size evaluation** [13812-38]

NETWORKS, COMMUNICATION, AND INTELLIGENT CONTROL SYSTEMS

- 13812 0H **Design of vehicle network reverse information feedback system based on 5G communication** [13812-5]
- 13812 0I **Application of LUA script in RS485 device cloud connection** [13812-15]
- 13812 0J **Dynamic identification method and engineering verification of power distribution network hazard AI** [13812-20]
- 13812 0K **Collaborative call for search based on suspended sonar and buoy** [13812-26]
- 13812 0L **Energy optimization management strategies for data centers assisted by AI** [13812-29]
- 13812 0M **Constructing a synergistic intelligent control system for industry-education integration and competition-driven pedagogy** [13812-34]

INTELLIGENT SENSING, STRUCTURAL ANALYSIS, AND MECHANICAL SYSTEMS

- 13812 0N **Temperature control of permanent magnets in magnetic resonance imaging** [13812-3]
- 13812 0O **Terahertz coding metasurface enabled by the phase transition of vanadium dioxide** [13812-11]
- 13812 0P **Graphene-based metasurfaces for switchable terahertz beam splitting** [13812-12]
- 13812 0Q **Graphene-integrated meta-lens for tunable terahertz wave focusing** [13812-13]
- 13812 0R **Research on axial damping performance of the metal hose** [13812-14]
- 13812 0S **Research on a temperature measurement method based on three primary colors of high-speed camera** [13812-37]
- 13812 0T **Shock response characteristics of nonlinear elastic vibration isolation system** [13812-39]
- 13812 0U **Failure analysis of expansion joints in the inlet duct of induced draft fans in thermal power plants** [13812-40]